

REMARKS

Claims 15-27 and 29 are pending in this application with claims 15-19 being independent. Claims 16, 22 and 23 have been allowed. Claims 1-14 and 28 have previously been canceled. Claims 15 and 17-19 have been amended in the present response.

Support for the amendments to claims 15, 17 and 18 are supported by the subject matter of the claims prior to the present amendment, because a Markush group provides support for any subset of that Markush group. Support for the amendment of claim 19 may be found in the specification at, for example, page 15, line 10.

No new matter has been introduced by the amendments.

I. Examiner's remarks in Item 2

The Examiner noted that, though the remarks in Applicant's response filed April 20, 2006 indicated an amendment to clarify the structure diagrams in claims 20, 22, 24 and 26, there were no changes to those structure diagrams. The Examiner is correct. No changes were made to the structure diagrams in the April 20, 2006 response.

The Examiner noted that the double bond pattern in the nitrogen-containing ring in claims 15-19 differed from the double bond pattern as shown in the previous amendment, but was equivalent. As the Examiner surmised, this alteration in the representation of the double bonds was not intended. Rather the changed double bond pattern resulted as a default orientation in the structure-drawing computer program. The present amendment shows the structure diagrams in claims 15-19 as they were presented in the June 30, 2005 amendment.

II. Examiner's withdrawal of prior art claim rejections

Applicants gratefully acknowledge the Examiner's withdrawal of the prior rejection of claim 19 as allegedly anticipated by Li *et al.*, of claims 15 and 17-19 as allegedly anticipated by JP 9-188874, and of claims 16 and 22 as allegedly obvious over a combination of JP 9-188874 and Li *et al.*

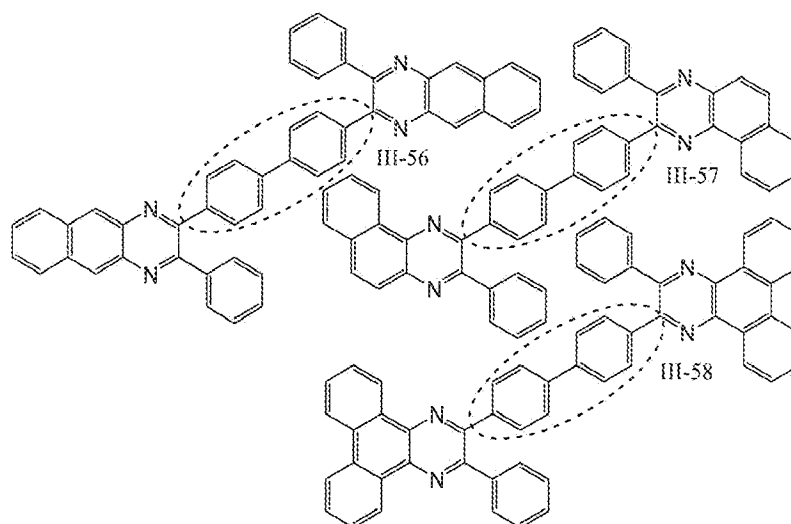
III. Claim Rejection under 35 U.S.C. 103(a)

A. Rejection over JP 9-188874

The Examiner has rejected claims 15, 17-19, 20, 24 and 26 under 35 U.S.C. 103(a) as allegedly obvious over JP 9-188874. The Examiner alleges that the cited reference “discloses specific examples of quinoxaline derivatives which are similar to compounds” in claims 15 and 17-19. The specific examples in JP 9-188874 to which the Examiner refers are:

- compounds III-56, III-159 and III-262 as allegedly being “examples of prior art compounds similar to those represented by the formulae in present claims 17 and 18;”
- compounds III-57, III-160 and III-263 as allegedly being “examples of prior art compounds similar to those represented by the formula in present claim 15;” and
- compounds III-58, III-161 and III-264 as allegedly being “examples of prior art compounds similar to those represented by the formula in present claim 19.”

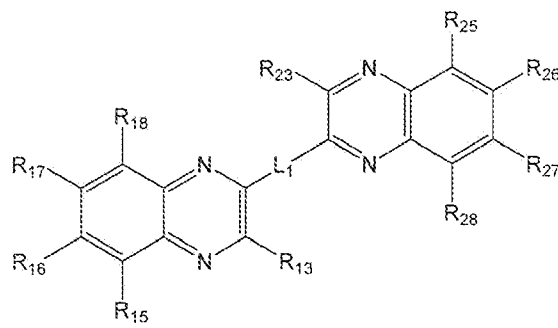
The structures of III-56, III-57 and III-58 are shown below as representative of the example compounds designated by the Examiner. The circled group, which is 1,4-biphenylene for compounds III-56 to III-58, is replaced by 1,4-phenylene for compounds III-159 to III-161, and by 1,5-naphthylidene for compounds III-262 to III-264.



Three criteria must be met to establish *prima facie* obviousness. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. Both the first and second requirements must come from the prior art, not applicants' disclosure. Third, the prior art reference or combination of references must teach or suggest all the limitations of the claims.

Claims 15 and 17-19, as presently amended, define X as an alkyl group, an unsubstituted aryl group or a substituted or unsubstituted heterocyclic group; and define Y as an alkyl group, an unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group. Thus, claims 15 and 17-19 clearly recite that, when X and Y are aryl groups, such aryl groups are unsubstituted.

JP 9-188874 discloses quinoxaline compounds that REQUIRE at least one substituted aryl group on the nitrogen-containing ring. Moreover, the required substituent is selected such that the quinoxaline compounds are symmetrical about the substituted aryl group. This structural feature is present in the broadest generic quinoxaline structure disclosed by JP 9-188874:



wherein L_1 (paragraph 11) is a phenylene, a biphenyl diyl radical or a naphthalene diyl radical. The feature is also present in every disclosed example of the Formula III compounds, including of course, the 9 examples cited specifically by the Examiner.

The Examiner alleges that “[I]t would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make other compounds similar to the specific compounds disclosed by the prior art, and within the prior art guidelines, in order to provide a

variety of compounds suitable for use in the prior art invention.” Applicants respectfully traverse the obviousness rejection.

First, as indicated above, the claimed compounds do not contain a substituted aryl group, while the by JP 9-188874 compounds JP 9-188874 REQUIRE an aryl group substituted with a group selected to make the compound symmetric about that aryl group. This structural limitation is an express requirement, disclosed by a broad generic structure and supported by 330 specific examples that are consistent with the limitations required by the generic structure. The JP 9-188874 disclosure provides no suggestion or motivation to modify this express structural limitation to make the compounds recited in the claims.

Second, even assuming for sake of argument that the JP 9-188874 disclosure contained a suggestion to make *similar* compounds, such a suggestion by a prior art reference does not meet the 35 U.S.C. 103(a) requirement. *Prima facie* obviousness requires the suggestion by the prior art reference to make the compounds of the invention, NOT merely *similar* compounds.

MPEP 2144.08 states that, “[I]n making an obviousness determination, Office personnel should consider the number of variables which must be selected or modified, and the nature and significance of the differences between the prior art and the claimed invention. See, *e.g.*, *In re Jones*, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992)”

The disclosure at paragraph 11 of JP 9-188874 is that substituents R₁₃, R₁₅, R₁₆, R₁₇, R₁₁₈, R₂₃, R₂₅, R₂₆, R₂₇, and R₂₈ are independently selected from a group of 13 different categories of substituents, *e.g.*, halogen, alkyl, alkoxy, etc. Modification of the JP 9-188874 disclosure to make compounds *similar* to the examples and “within the prior art guidelines” could conceivably proceed in myriad different directions by substituting any of the 10 different R-groups on formula III with any of the 13 different classes of substituent disclosed by JP 9-188874.

Suggestion by the JP 9-188874 disclosure, if any, may be for one to make compounds like one of the 330 working examples of formula III compounds, *i.e.*, containing an aryl group substituted so as to be symmetric about that substituted aryl group. As stated earlier, such a suggestion would not provide motivation to make the claimed compounds.

Based on the above comments, Applicants respectfully request that the obviousness rejection over JP 9-188874 be withdrawn.

B. Rejection over JP 9-188874 in view of Li *et al.*

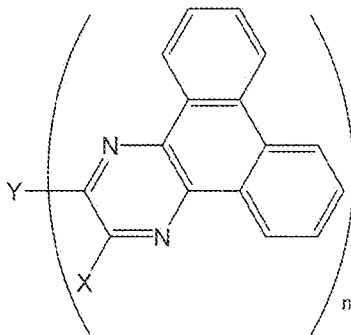
The Examiner has rejected dependent claims 21, 25, 27, and 29 under 35 U.S.C. 103(a) as allegedly obvious over JP 9-188874 in view of Li *et al.*

Nothing in the Li *et al.* reference provides what is missing from JP 9-188874 regarding any motivation or suggestion to make the compounds recited in claims 15 and 17-19, which all contain aryl groups that are substituted so as to be symmetric about that substituted aryl group. Thus, the cited combination does not provide motivation to use the recited compounds in combination with an additional luminescent material.

Accordingly, neither claims 15 and 17-19, nor any claim that depends from those claims can be deemed obvious in view of these two references. Based on the above comments, Applicants respectfully request that the examiner reconsider and withdraw the obviousness rejection over JP 9-188874 in view of Li *et al.*

C. Rejection over Li *et al.*

The Examiner has rejected claim 19 under 35 U.S.C. 103(a) as allegedly obvious over JP 9-188874 in view of Li *et al.* Claim 19 has been amended herein to recite a structure diagram containing furan-2-yl groups at the 2- and 3-positions of the quinoxaline ring. Li *et al.* disclose organic light emitting devices comprising certain quinoxaline derivatives according to the formula:



wherein n is 1-12, and X and Y are independently H, alkyl, alkoxy, aryl, heteroaryl, fused aryl, fused heteroaryl, fused aryl with functional groups, fused heteroaryls with functional groups, or similar materials when n is 1. Li teaches that the disclosed quinoxaline derivatives may be used in the light-emitting layer of an electroluminescent device.

As stated above, an obviousness determination requires consideration of the number of variables which must be selected or modified, and the nature and significance of the differences between the prior art and the claimed invention. (MPEP 2144.08). MPEP 2144.08 goes on to state:

Similarly, consider any teaching or suggestion in the reference of a *preferred species or subgenus that is significantly different in structure from the claimed species or subgenus*. Such a teaching may weigh against selecting the claimed species or subgenus and thus against a determination of obviousness. *Baird*, 16 F.3d at 382-83, 29 USPQ2d at 1552 (reversing obviousness rejection of species in view of large size of genus and disclosed "optimum" species which differed greatly from and were more complex than the claimed species); *Jones*, 958 F.2d at 350, 21 USPQ2d at 1943 (reversing obviousness rejection of novel dicamba salt with acyclic structure over broad prior art genus encompassing claimed salt, where disclosed examples of genus were dissimilar in structure, lacking an ether linkage or being cyclic). For example, teachings of *preferred species of a complex nature within a disclosed genus may motivate an artisan of ordinary skill to make similar complex species and thus teach away from making simple species within the genus*. *Baird*, 16 F.3d at 382, 29 USPQ2d at 1552. (emphasis added)

In this instance, the compounds disclosed by Li *et al.* span a very large structural range, due in part to the presence of the variable "n" that ranges from 1 to 12, thereby permitting up to 12 dibenzoquinoxaline ring systems to be bonded about a single Y group. Li *et al.* disclose three examples that are simpler structures containing a single dibenzoquinoxaline substituted by two aryl or heteroaryl groups,. Li *et al.* disclose two other examples containing one dibenzo-quinoxaline fused to another polycyclic group to produce a single large polycyclic system having 7 or 8 fused rings. Li *et al.* disclose eleven examples that are much more complex structures within the broad generic disclosure, that contain multiple dibenzoquinoxaline groups attached to a central group.

Li *et al.* provide no suggestion or motivation to make the compounds of claim 19 as it is amended herein, *i.e.*, quinoxaline compounds substituted at the 2- and 3-positions by furan-2-yl groups. Li *et al.* disclose a generic structure that may be modified in many different ways, including variation of n, to produce more complex compounds having up to twelve dibenzoquinoxaline groups bonded to a Y group. Eleven of the sixteen examples provided by Li *et al.* have a structure that is significantly different and of a more complex nature than the

structure of claim 19 compounds. Two other examples are dibenzoquinoxalines fused with other rings to form 7- and 8-ring structures that are also significantly different from the claim 19 compounds. As in *Baird*, the motivation by Li *et al.*, if any, may be to make the larger ($n > 1$) more complex compounds like the 11 disclosed examples.

Even for the three disclosed Li *et al.* compounds that are simpler structures, containing one dibenzoquinoxaline group substituted by two aryl/heteroaryl groups, only three specific groups: phenyl, pyridyl and thiophene are disclosed. Li *et al.* expressly disclose (column 11, line 65) that of these three groups, the two six-member rings, phenyl and pyridyl, are preferred over the single disclosed five-member ring, thiophene. Thus, for the Li *et al.* compounds when n is 1, the disclosed preference for two six-member aromatic groups provides no motivation to use other five-member aromatic groups.

Thus, though Li *et al.*, discloses numerous variables whereby the disclosed compounds might potentially be modified, it provides no guidance or motivation to select from among those variables a modification that would result in the claim 19 compounds. Rather, if anything, Li *et al.* teaches away from compounds like those in claim 19; first, by providing nearly four times as many examples of complex ($n > 1$) examples as simple examples, and second, by teaching, for simpler compounds (one dibenzoquinoxaline group substituted by two aryl/heteroaryl groups), a preference for six-member aromatic substituents.

In view of the above remarks, applicant respectfully requests that the obviousness rejection over Li *et al.* be withdrawn. Also, in view of the present amendment and the above remarks, applicant submits that all claims are in condition for allowance.


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